RATIO AND PROPOTIONS

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1) Ram, Shyam and Suresh Start business investing the ratio 1/2 : 1/3 : 1/6. The time for each of them invested their money was in the ratio 8:6:12 respectively. If they get profit of RS. 18000 from the business, then how much profit does RAM get?

a.) RS 4000 b.) RS. 6000 c.) RS. 8000 d.) RS. 10000

1/2 : 1/3 : 1/6

L.C.M = 6

$\frac{1}{2}\times 6 : \frac{1}{3}\times 6 : \frac{1}{6}\times 6$

3 : 2 : 1 → Ratio of Investment

8 : 6 : 12 → time

3x8 : 2x6 : 1x12

24 : 12 : 12

2 : 1 : 1

R = RAM

$R = \frac{2}{2+1+1} \times 18,000$

$= \frac{2}{4} \times 18000$

= 9000.

Sh = Shyam = $\frac{1}{4} \times 18000$

= 4500

Su = Suresh = $\frac{1}{4} \times 18000$

= 4500

BUT If we change the Investment ratio of Suresh to 1/4 then we get 8000 which is in option.

9000 is not in option give.

for Suresh investment change to 1/4

L.C.M = 12

$\frac{1}{2}\times 12 : \frac{1}{3}\times 12 : \frac{1}{4}\times 12$

6 : 4 : 3 → Ratio of investment

8 : 6 : 12 → time

6x8 : 4x6 : 3x12

48 : 24 : 36

4 : 2 : 3

RAM = $\frac{4}{9} \times 18,000 = 8,000$

SHYAM = $\frac{2}{9} \times 18,000 = 4,000$

SURESH = $\frac{3}{9} \times 18,000 = 6,000$

2.) The ratio of the number of boys and girls in a college is 7:8 If the percentage increase in the number of boys and girls be 20% and 10% respectively. what will be the new ratio.

a.) 8:9 b.) 17 : 18 c.) 21 : 22 d.) can not determined

B : G = 7 : 8

B↑ = $\frac{20}{100}$ G↑ = $\frac{10}{100}$

B → (100% + B↑)x ⇒ $\frac{120}{100} \times 7x = \frac{42}{5}x$

G → (100% + G↑)x ⇒ $\frac{110}{100} \times 8x = \frac{44}{5}x$

$\frac{42}{5}x : \frac{44}{5}x$

42 : 44

21 : 22

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8.) P, Q, R are 3 positive number $Q = (P+Q+R)/2$, if $(Q-P) : (Q-Q) : (Q-R) = 2:5:7$ then find ratio of $P:Q:R$

a.) 4:3:7
b.) 12:9:7
c.) 9:7:4
d.) 4:3:2

$$Q = \frac{(P+Q+R)}{2}$$

$Q - P = 2K$ - (1)
$Q - Q = 5K$ - (2)
$Q - R = 7K$ - (3)
(1) + (2) + (3)
$3Q - (P+Q+R) = 14K$ - (4)

$P+Q+R = 2Q \Rightarrow$ From given
$3Q - 2Q = 14K$
$Q = 14K$ - (5)

Substitute (5) in (1), (2), (3)

$14K - P = 2K$ | $14K - Q = 5K$ | $14K - R = 7K$
$12K = P$ | $9K = Q$ | $7K = R$

$P:Q:R \Rightarrow$ 12:9:7

4.) A and B together have RS. 1210. If $\frac{4}{15}$ of A's ammount is equal to $\frac{2}{5}$ of B's ammount how much does B have

a.) RS. 460 b.) RS. 484 c.) RS. 550 d.) RS. 664

$A + B = 1210$
$\frac{4}{15} \rightarrow A$ & $\frac{2}{5} \rightarrow B$
L.C.M = is 15
$A \rightarrow \frac{4}{15} \times 15 = 4$
$B \rightarrow \frac{2}{5} \times 15 = 6$

A:B $\Rightarrow$ 4:6 $\Rightarrow$ 2:3 as A equal to B and B equal to A is given in problem so ratio changed to 3:2

$A \rightarrow \frac{3}{5} \times 1210$
$A = \frac{3630}{5}$
$A = 726$

$B \rightarrow \frac{2}{5} \times 1210$
$B = \frac{2420}{5}$
$B = 484$

5.) Two numbers are respectively 20% and 50% more than a 3rd number. The ratio of the two numbers is
a.) 2:5 b.) 3:5 c.) 2:5 d.) 6:7

num1 : num2 : num3
20% ↑ : 50% ↑ : k
$\frac{120}{100} k$: $\frac{150}{100} k$

$\frac{12}{10} = \frac{12}{15} = \frac{4}{5}$
$\frac{15}{10}$

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6.) The ratio of the cost prices of two articles A and B is 4:5. The articles are sold at a profit with their selling prices being in the ratio 5:6. If the profit on article A is half of its cost price, find the ratio of the profits on the articles A and B?

a.) 7:10
b.) 9:11
c.) 5:9
d.) 10:11

A:B ⇒ 4:5 ⇒ cost price
A:B ⇒ 5:6 ⇒ selling price
profit = selling price + cost price
Selling price = profit + cost price

$\frac{SP(A)}{SP(B)} = \frac{5}{6}$ — (1)

Also profit on a $= \frac{1}{2} \times C.P(a)$
$= \frac{1}{2} \times 4x$
$= 2x$

P(a) : P(b) = ?

$\frac{2x + 4x}{P(b) + 5x} = \frac{5}{6}$

$6(6x) = 5(P(b)) + 25x$
$36x - 25x = 5P(b)$
$\frac{11x}{5} = P(b)$

$P(a) : P(b)$
$\frac{2x}{1} : \frac{11x}{5}$

10:11

7.) A sum of money is to be distributed among A, B, C, D in the proportion of 5:2:4:3. If C gets RS. 1000 more than D, what is total ammount?

a.) RS. 14000
b.) RS. 15000
c.) RS. 20000
d.) None of these

A : B : C : D
5 : 2 : 4 : 3
5x : 2x : 4x : 3x
4x − 3x = 1000
x = 1000
5x + 2x + 4x + 3x = 14x = 14(1000) = 14,000

8.) If RS. 782 be divided into three parts, proportional to $\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$ then the first part is

a.) RS. 182 b.) RS. 190 c.) RS. 196 d.) 204

1/2 : 2/3 : 3/4 ⇒ L.C.M = 12
$\frac{1}{2} \times 12 : \frac{2}{3} \times 12 : \frac{3}{4} \times 12$
6 : 8 : 9

$\frac{6}{6+8+9} = \frac{6}{23} \times 782 = \frac{4692}{23} = 204$

9) A Bag contains 50 paisa, 20 paisa and 10 paisa coins in the ratio of 5:3:1. If the total amount in the bag is 640 RS, Find the difference in the ammounts contributed by 50 paisa and 20 paisa coins

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a) RS. 300 b) RS. 400 c) RS. 380 d) None of these

640RS

50P : 20P : 10P =
5 : 3 : 1
5x : 3x : 1x
$\frac{1}{2} : \frac{1}{5} : \frac{1}{10}$

$\frac{5x}{2} + \frac{3x}{5} + \frac{1x}{10} = \frac{(25+6+1)x}{10} = \frac{32x}{10}$

$\frac{32x}{10} = 640$ RS.

$32x = 6400$

$x = 200$

(or)

$50(5x) + 20(3x) + 10(1x) = 320x$

$320x = 640$ RS

$320x = 64000$ paisa

$x = 200$

50P × 5(200) = 50 × 1000 = 50,000 P

20P × 3 × 200 = 600 × 20 = 12,000 P

10P × 1 × 200 = 2000 P

Difference of 50P to 20Pa = 50,000 − 12,000 = 38,000 P

100 Paisa = 1 RS

$\frac{38,000}{100}$ = 380 RS

10) The Speed of an engine is proportional to the square root of the number of wagons attached to it. Without any wagons attached to it the speed of an engine is 60 km/hr. With 16 wagons attached to it the speed of the engine is 40 km/hr; Find the maximum number of wagons that can be attached so that the train moves.

a) 144 b) 145 c) 142 d) 143

x be the diminished speed of y wagons $x = k\sqrt{y}$

The speed is reduced by 20 for 16 wagons.

$20 = k\sqrt{16}$

$20 = 4k$

$k = 5$

$60 = 5\sqrt{y} \Rightarrow \sqrt{y} = 12 \Rightarrow y = 144$

Maximum wagons to stop ⇒ 144 − 1 → 143 → Till it moves

It can pull 143 wagons.

11) If 0.4 of a number is equal to 0.06 of another number, the ratio of the number is

a) 2:3 b) 3:4 c) 3:20 d) 20:3

4 : 0.06x

4 : 0.6x

40 : 6x

20 : 3x → as 0.4 = 0.6 of some thing of answer is 3:20

12) The ratio of incomes of two persons P_1 and P_2 is 5:4 and ratio of their expenditure is 3:2. If at the end of the year, each saves RS. 1600 then what is the income of P1?

Income → P1 : P2 → 5 : 4

Expense → P1 : P2 → 3 : 2

a) RS. 800 b) RS. 2400 c) RS. 4000 d) RS. 3200

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Saving = Income - Expense

$1600 = 5x(12) - 3x(12)$

$1600 = 60x - 36x$

$1600 = 24x$

$x = \frac{1600}{24} = \frac{200}{3}$

$\frac{20}{\cancel{60}} \times \frac{200}{\cancel{3}_1} = 4000$

(OR)

$5x - 3y = 1600$ — (1)

$4x - 2y = 1600$ — (2)

(1)×2 $\Rightarrow 10x - 6y = 3200$

(2)×3 $\Rightarrow 12x - 6y = 4800$

$2x = 1600$

$x = 800$

$5(800) = 4000$.

13.) The mean proportional b/w 234 and 104 is

a.) 12 b.) 39 c.) 54 d.) None of these

$234 : x :: x : 104$

$\frac{234}{x} = \frac{x}{104}$

$x^2 = 234 \times 104$

$x^2 = 24336$

$x = 156$.

14.) The seats in an Engineering College for computer Science, Electronics and civil are in the ratio of 5:7:8. There is a proposition to increase these seats by 40%, 50% and 75% respectively. what will be the ratio of increased seats.

a.) 2:3:4 b.) 6:7:8 c.) 6:8:9 d.) none of these.

C.S.E : E : C

$5x : 7x : 8x$

40%↑ : 50%↑ : 75%↑

$\frac{140}{100} \times 5x$ | $\frac{150}{100} \times 7x$ | $\frac{175}{100} \times 8x$

$7x$ | $\frac{21}{2}x$ | $14x$

$7x : \frac{21}{2}x : 14x$

$14x : 21x : 28x$

$2 : 3 : 4$

15.) If 96 is divided into four proportional to 5, 7, 4, 8 then the smallest part is:

a.) 16 b.) 14 c.) 20 d.) 18

$\frac{5}{29_1} \times \frac{4}{\cancel{96}} = 20$ | $\frac{7}{29_1} \times \frac{4}{\cancel{96}} = 28$ | $\frac{4}{29_1} \times \frac{4}{\cancel{96}} = 16$ | $\frac{8}{29_1} \times \frac{4}{\cancel{96}} = 32$

16.) The price of 357 apples is RS 2499 what is the price of 49 dozens of such apples?

a.) RS. 3800 b.) RS. 2816 c.) RS. 4116 d.) RS. 3116

$\frac{357}{2499} = \frac{49 \times 12}{x} \Rightarrow 357x = 49 \times 12 \times 2499 \Rightarrow x = \frac{49 \times 12 \times 2499}{357}$

$x = 4116$

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17) Some ladies can do a piece of work in 12 days. Two times the number of such ladies will do half of that work in

a.) 6 days b.) 4 days c.) 12 days d.) 3 days

$\frac{2x}{x} \Rightarrow \frac{1/2}{1} :: 12 : z$

$2x : x :: 12 : z$

$\frac{x}{2} : \frac{2x}{1} :: 12 : z$

1 -> complete work
1/2 -> half work
z -> days

Let us consider x men do certain work in 12 days

2x work -> How many days -> half work

Assume 2 unit of work

$\frac{x \times 12}{2} = \frac{2x \times y}{1}$

$12x = 4xy$

$\boxed{y = 3}$

18.) A piece of work can finish by a certain number of men in 100 days. If however, there were 10 men less, it would take 10 days more for the work to be finished. How many men were there originally

a.) 75 b.) 82 c.) 100 d.) 110

$\frac{x}{x-10} = \frac{110}{100}$

$100x = 110x - 1100$

$10x = 1100$

$\boxed{x = 110}$

19.) It takes 10 days for digging a trench of 100 m long, 50m broad and 10 m deep. What length of trench, 25 m broad, 15m deep can be dug in 30 days.

Days 10 : 30

Breadth = 25 : 50

Depth = 15 : 10

$10 \times 25 \times 15 \times x = 30 \times 50 \times 10 \times 100$

$x = 2 \times 4 \times 50$

$\boxed{x = 400}$

a.) 400m
b.) 200 m
c.) 100 m
d.) 89 m

20) A wheel rotates 10 times every minute and moves 20cm during each rotation. How many meters does the wheel move in one hour?

a.) 6 meter b.) 12 meter c.) 120 meter d.) 1200 meter

min : distance

1 : 20 x 10

1 : 200 in cm

1 : 20 in m

1 : 20 :: 60 : x

$\frac{1}{20} = \frac{60}{x}$

$\boxed{x = 1200}$